ifm electronic

CE

Operating instructions
Pressure sensor

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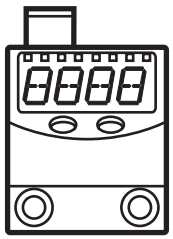


Contents

1 Preliminary note 3
1.1 Symbols used 3

2 Safety instructions 3

3 Functions and features 4
3.1 Use of the main connection G1/8 4
3.2 Use of the auxiliary connection M5 4

4 Function 5
4.1 Output signals 5
4.2 Switching function 5
4.3 IO-Link 6
4.3.1 General information 6
4.3.2 Device-specific information 6
4.3.3 Parameter setting tools 6

5 Installation 7
5.1 Mounting accessories 7
5.2 DIN rail mounting 7
5.3 Panel mounting 8

6 Electrical connection 8

7 Operating and display elements 9

8 Menu 10
8.1 Menu structure 10
8.2 Explanation of the menu 11

9 Parameter setting 12
9.1 Parameter setting in general 12
9.2 Set output signals 14
9.2.1 Set the unit of measurement for system pressure 14
9.2.2 Set the output function 14
9.2.3 Set the switching limits (hysteresis function) 14
9.2.4 Set the switching limits (window function) 14
9.3 User settings (optional) 15
9.3.1 Set delay for the switching outputs 15
9.3.2 Set damping for the switching outputs 15

9.3.3 Configuration of the display 15
9.3.4 Zero-point calibration 16
9.3.5 Differential pressure measurement: optimisation of the sensor accuracy 16
9.4 Service functions 16
9.4.1 Read min/max values for the system pressure 16
9.4.2 Reset all parameters to factory setting 17
10 Operation 17
10.1 Read set parameters 17
10.2 Error indications 17
11 Technical data and scale drawing 18
12 Factory setting 18

1 Preliminary note

1.1 Symbols used

▶ Instruction

> Reaction, result

[…] Designation of pushbuttons, buttons or indications

→ Cross-reference

Important note
Non-compliance can result in malfunction or interference.

2 Safety instructions

- Please read this document prior to set-up of the unit. Ensure that the product is suitable for your application without any restrictions.
- If the operating instructions or the technical data are not adhered to, personal injury and/or damage to property can occur.
- Check the compatibility of the product materials (see technical data) with the media to be measured (see data sheet at www.ifm.com).

3 Functions and features

The unit monitors the system pressure/differential pressure in compressed air networks and pneumatic systems of machines and plants.

Avoid static and dynamic overpressure exceeding the specified overload pressure by taking appropriate measures.
The indicated bursting pressure must not be exceeded.
Even if the bursting pressure is exceeded only for a short time, the unit may be destroyed. ATTENTION: Risk of injury!

Pressure Equipment Directive (PED): The units comply with section 3, article (3) of the Directive 97/23/EC and are designed and manufactured for media of fluid group 2 (stable gases and non-superheated liquids) in accordance with the sound engineering practice.

3.1 Use of the main connection G1/8

Application: compressed air (other media on request); type of pressure: relative pressure

Order no.	Measuring range		Permissible overload pressure		Bursting pressure	
	bar	PSI	bar	PSI	bar	PSI
PQ3809	-1...1	-14.5...14.5	20	290	30	435
PQ3834	-1...10	-14.5...145	20	290	30	435

MPa = bar ÷ 10 / kPa = bar × 100

3.2 Use of the auxiliary connection M5

Observe the respective notes in these instructions for measurement accuracy optimisation for differential pressure measurements (→ chapter 9.3.5 Differential pressure measurement).

Application: compressed air (other media on request); use for differential pressure measurement; connection of the low pressure side.

In particular for filter monitoring, the output side of the filter (i.e. the lower pressure level) is connected to the auxiliary connection M5 while the input side of the filter is connected to the G1/8 connection (→ chapter 3.1 Use of the main connection G1/8, → chapter 5 Installation). Observe the following pressures in this application:

- **Permissible overload pressure** in the auxiliary connection as opposed to the main connection: 2 bar / 29 PSI.
- **Bursting pressure** of the auxiliary connection as opposed to the main connection: 12 bar / 174 PSI.

4 Function

4.1 Output signals

- The unit displays the current system pressure (with use of the main connection G1/8 only) or the differential pressure (with additional use of the auxiliary connection M5).
- It generates 2 output signals according to the parameter setting.

OUT1	Switching signal for limit value / IO-Link
OUT2	Analogue output 4...20 mA (fixed across the measuring range of the sensor)

4.2 Switching function

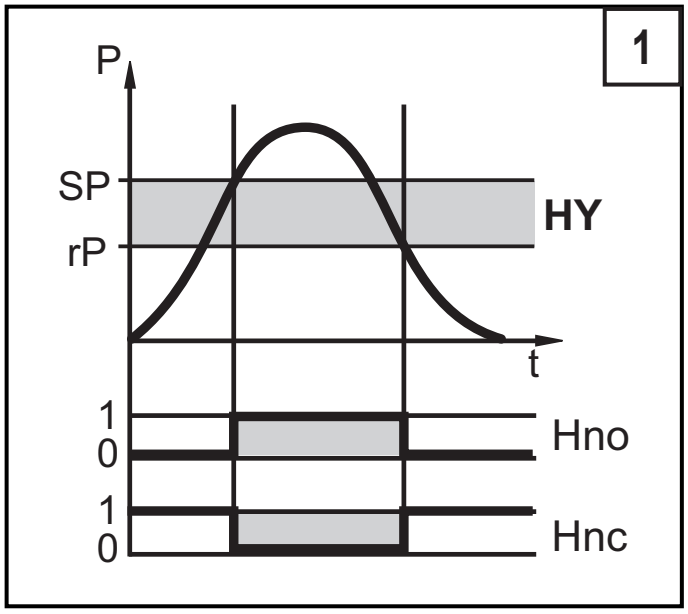
OUT1 changes its switching state if it is above or below the set switching limits (SP1, rP1). The following switching functions can be selected:

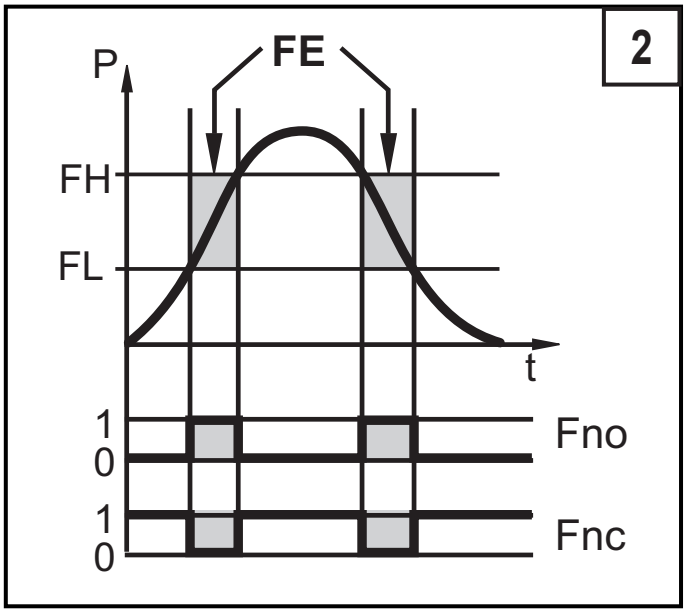
- Hysteresis function / normally open: [ou1] = [Hno] (→ Fig. 1).
- Hysteresis function / normally closed: [ou1] = [Hnc] (→ Fig. 1).

First the set point (SP1) is set, then the reset point (rP1) with the requested difference.

- Window function / normally open: [ou1] = [Fno] (→ Fig. 2).
- Window function / normally closed: [ou1] = [Fnc] (→ Fig. 2).

The width of the window can be set by means of the difference between FH1 and FL1. FH1 = upper value, FL1 = lower value.





P = system pressure / differential pressure; HY = hysteresis; FE = window

4.3 IO-Link

4.3.1 General information

This unit has an IO-Link communication interface which requires an IO-Link-capable module (IO-Link master) for operation.

The IO-Link interface enables direct access to the process and diagnostic data and provides the possibility to set the parameters of the unit during operation.

In addition communication is possible via a point-to-point connection with a USB adapter cable.

You will find more detailed information about IO-Link at www.ifm.com/gb/io-link.

4.3.2 Device-specific information

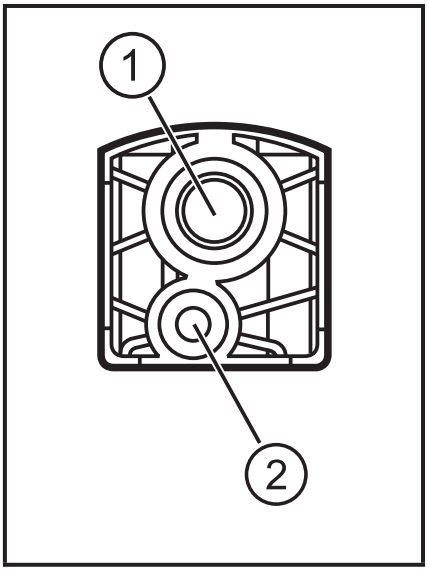
You will find the IODDs necessary for the configuration of the IO-Link unit and detailed information about process data structure, diagnostic information and parameter addresses at www.ifm.com/gb/io-link.

4.3.3 Parameter setting tools

You will find all necessary information about the required IO-Link hardware and software at www.ifm.com/gb/io-link.

5 Installation

Before installing and removing the unit: Make sure that no pressure is applied to the system.



- ▶ Screw the pressure connection or adapter G1/8 to the main pressure connection (1) and tighten:
  - Maximum tightening torque: 8 Nm.
  - Maximum thread length: 7.5mm
- ▶ If required: Screw the pressure connection or adapter M5 to the auxiliary pressure connection (2) and **slightly tighten** to avoid damage to the thread:
  - Maximum tightening torque: 2.5 Nm.
  - Maximum thread length: 7.5mm

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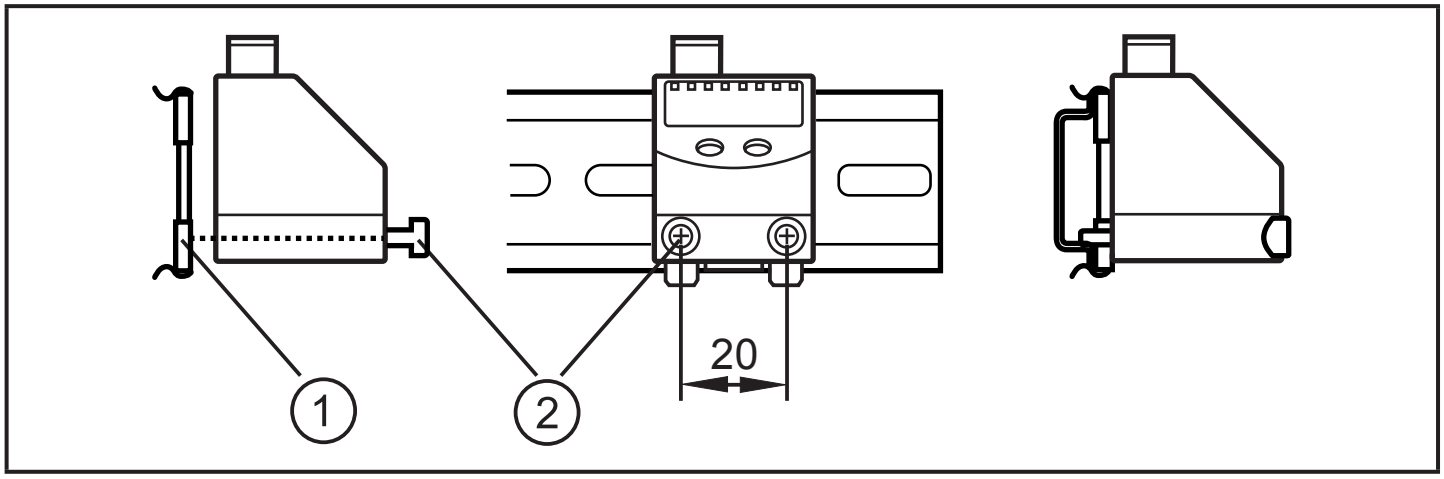
5.1 Mounting accessories

The following components can be supplied as accessories:	Order no.
Mounting set for DIN rail mounting (DIN rail TH 35-7.5 to EN 60715)	E37340

5.2 DIN rail mounting

DIN rail TH 35-7.5 to EN 60715

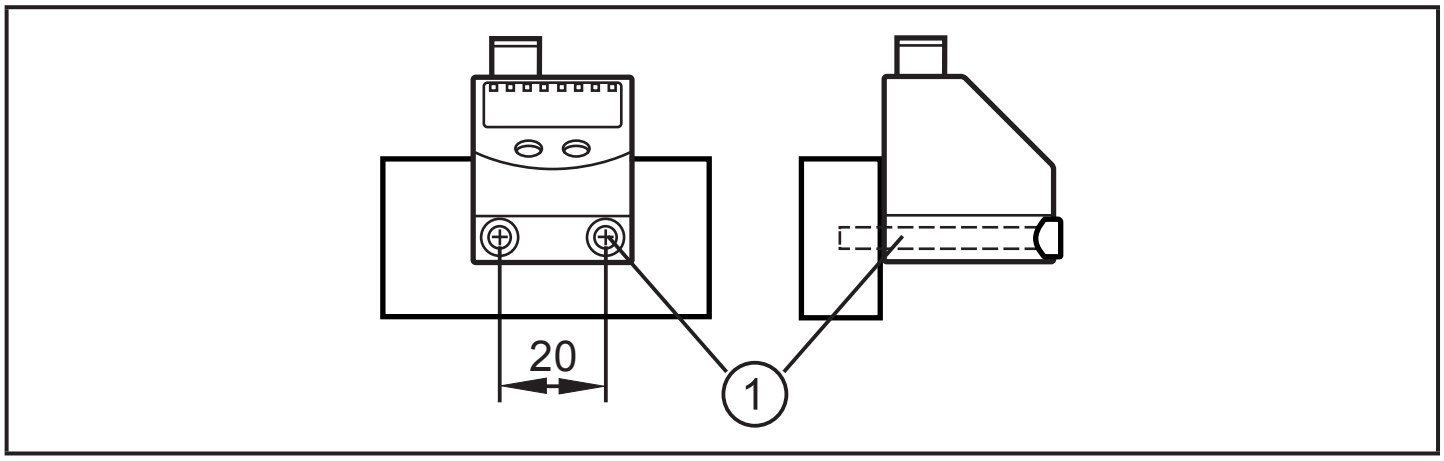


- ▶ Fix the mounting clip (1) with the M4 x 35 screws (2) to the flange. Maximum tightening torque: 2.5 Nm.
- ▶ Hook the unit into the DIN rail and clip it into place.

Removal:

▶ Lever out the mounting clip with a screwdriver at the top or at the bottom and remove the unit.

5.3 Panel mounting



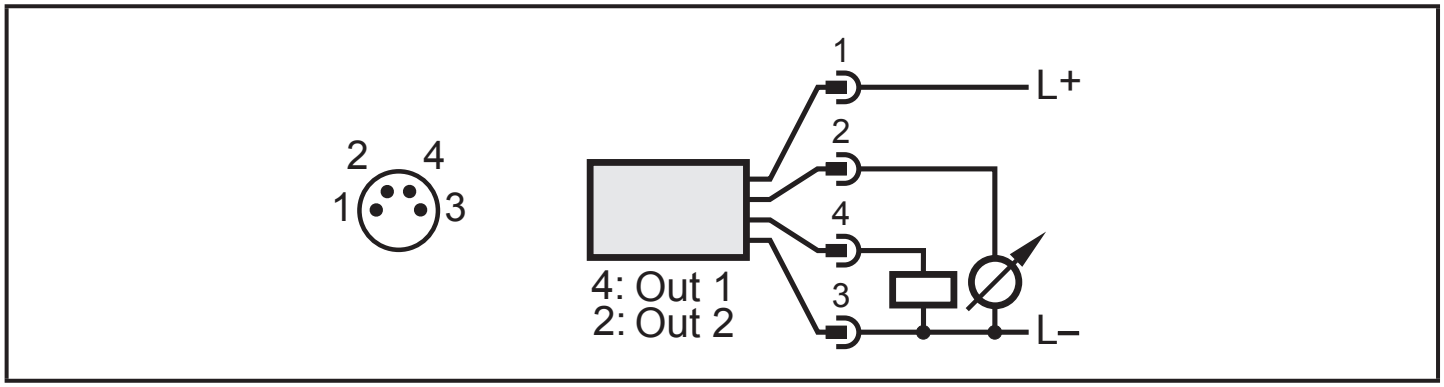
▶ Fix the unit with 2 M4 x 35 screws (1) (not included) to the rear panel. Maximum tightening torque: 2.5 Nm.

6 Electrical connection

The unit must be connected by a qualified electrician.
The national and international regulations for the installation of electrical equipment must be adhered to.
Voltage supply to EN 50178, SELV, PELV.

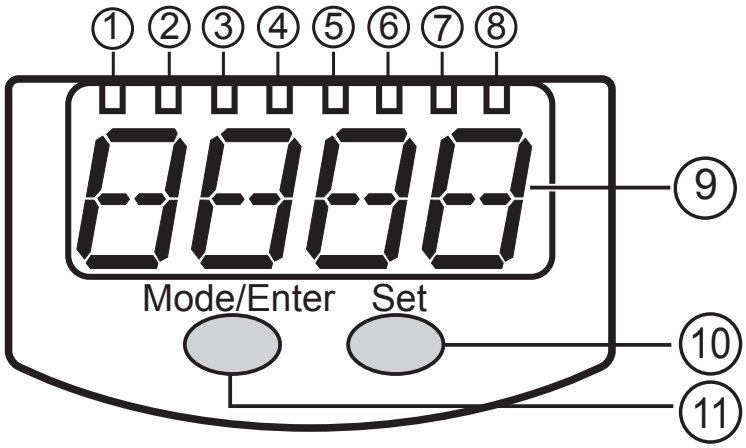
▶ Disconnect power.

▶ Connect the unit as follows:



Pin 1	Ub+
Pin 3	Ub-
Pin 4 (OUT1)	Binary switching output pressure monitoring / IO-Link
Pin 2 (OUT2)	Analogue output for pressure monitoring

7 Operating and display elements



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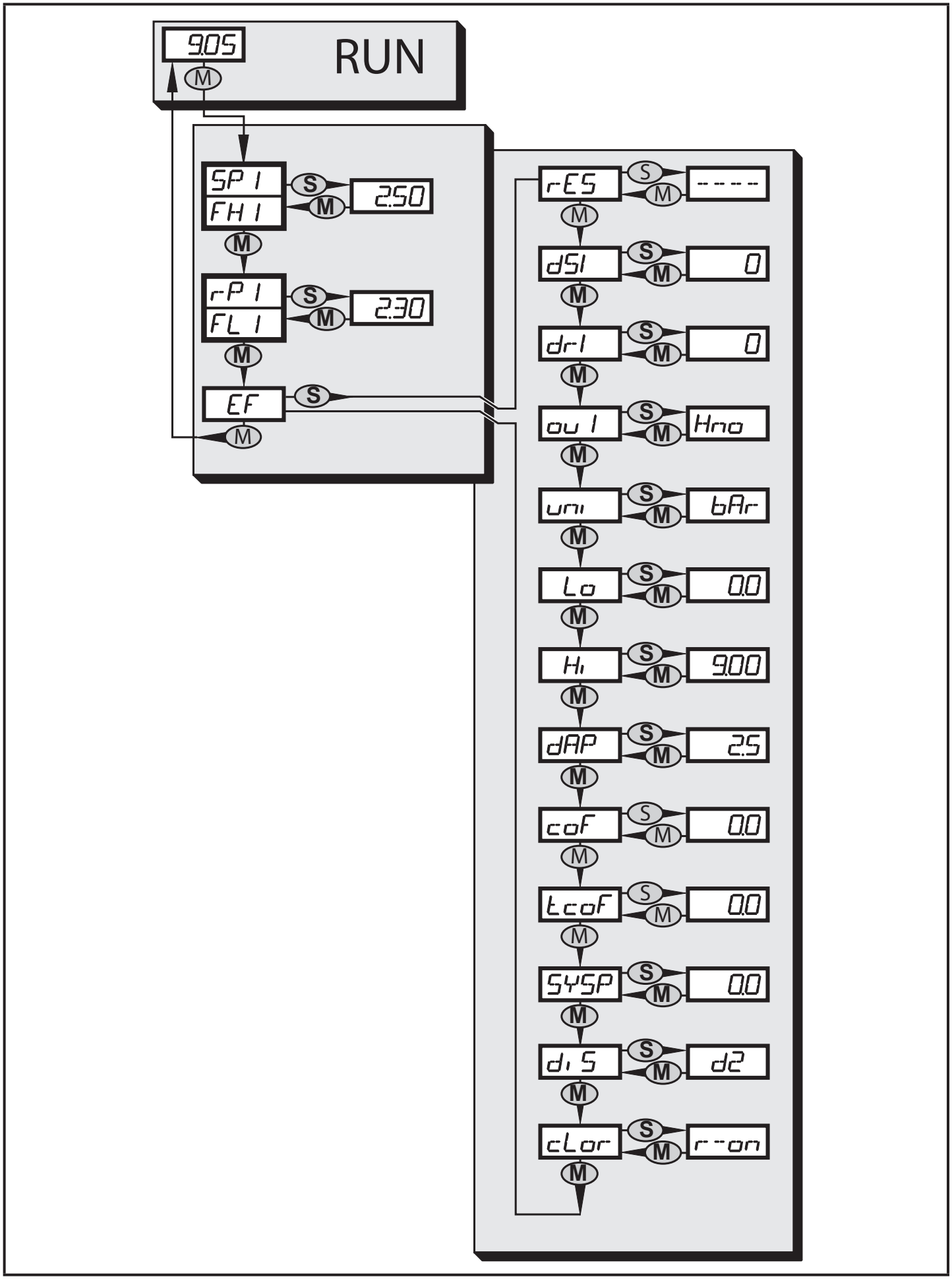
1 to 8: Indicator LEDs
- LED 1 to LED 4 = system pressure / differential pressure in the unit of measurement which is indicated on the label. - LEDs 5, 6, 7: not used. - LED 8 = switching status of the output
9: Alphanumeric display, 4 digits
- Display of the current system pressure. - Indication of the parameters and parameter values.
10: Set button
- Setting of the parameter values (scrolling by holding pressed; incrementally by pressing once).
11: Mode/Enter button
- Selection of the parameters and acknowledgement of the parameter values.

8 Menu

8.1 Menu structure



8.2 Explanation of the menu

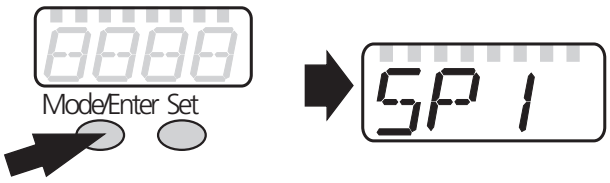
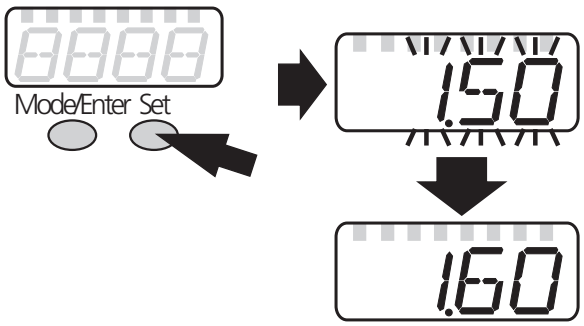
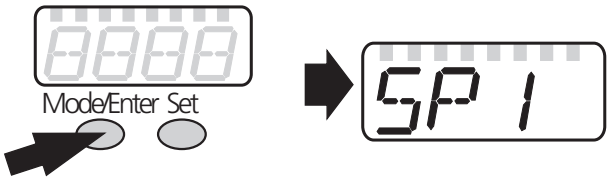
SP1/rP1	Upper / lower limit value for system pressure at which OUT1 switches.
FH1/FL1	Upper / lower limit for the acceptable range (monitored by OUT1).
EF	Extended functions / opening of menu level 2.
rES	Restore factory setting.
dS1	Switch-on delay for OUT1.
dr1	Switch-off delay for OUT1.
OU1	Output function for OUT1: Switching signal for the pressure limit values: hysteresis function [H ..] or window function [F ..], either normally open [. no] or normally closed [. nc].
Uni	Standard unit of measurement for system pressure.
Lo	Minimum value memory for system pressure.
HI	Maximum value memory for system pressure.
dAP	Damping for the switching outputs.
COF	Manually enter the zero point calibration.
tcoF	Teach zero-point calibration.
SySP	Setting of the system pressure for optimised differential pressure measurement.
diS	Update rate and orientation of the display.
cLor	Colour of the digital display (permanent or alternating with switching status OUT1).

9 Parameter setting

During parameter setting the unit remains in the operating mode. It continues to monitor with the existing parameters until the parameter setting has been completed.

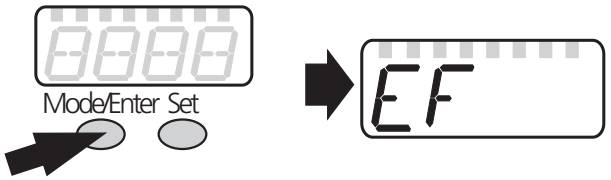
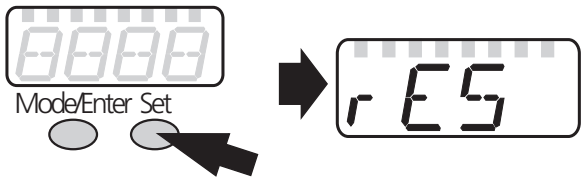
9.1 Parameter setting in general

3 steps must be taken for each parameter setting:

<table>
<tr><td>1</td><td>Select parameter
▶ Press [Mode/Enter] until the requested parameter is displayed.</td><td> 
</td></tr>
<tr><td rowspan="2">2</td><td>Set parameter value
▶ Press [Set] and keep it pressed.
> Current setting value of the parameter flashes for 5 s.
> After 5 s: setting value is changed: incrementally by pressing the button once or continuously by keeping the button pressed.</td><td> 
</td></tr>
<tr><td colspan="2">Numerical values are incremented continuously. For reducing the value: let the display move to the maximum setting value. Then the cycle starts again at the minimum setting value.</td></tr>
<tr><td>3</td><td>Acknowledge parameter value
▶ Briefly press [Mode/Enter].
> The parameter is displayed again. The new setting value is saved.</td><td> 
</td></tr>
<tr><td colspan="3">Setting of other parameters:
▶ Start again with step 1.</td></tr>
<tr><td colspan="3">Finishing the parameter setting:
▶ Press [Mode/Enter] several times until the current measured value is displayed or wait for 15 s.
> The unit exits the parameter setting mode.</td></tr>
</table>

- If [C.Loc] is displayed when an attempt is made to modify a parameter value, parameters are read or written via the IO-Link interface (temporary locking).
- If [SLoc] is displayed when an attempt is made to modify a parameter value, the sensor is locked via software. This locking cannot be removed on the sensor but unlocking has to be made via the IO-Link interface.

- Change from menu level 1 to menu level 2:

▶ Press [Mode/Enter] until [EF] is displayed. If the submenu is protected with an access code, [cod1] is displayed. ▶ Press [Set] and keep it pressed until the valid code no. is displayed. ▶ Briefly press [Mode/Enter]. When delivered by ifm electronic: no access restriction.	
▶ Briefly press [Set]. > The first parameter of the submenu is displayed (here: [rES]).	

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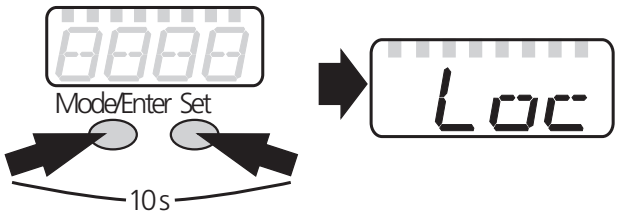
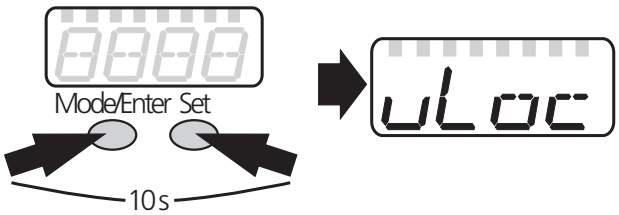
- Locking / unlocking
  The unit can be locked electronically to prevent unintentional settings. Locking is also possible via an IO-Link capable parameter setting tool.

▶ Make sure that the unit is in the normal operating mode. ▶ Press [Mode/Enter] + [Set] for 10 s. > [Loc] is displayed.	
During operation: [Loc] is displayed for 15 s if you try to change parameter values.	
For unlocking: ▶ Press [Mode/Enter] + [Set] for 10 s. > [uLoc] is displayed.	

On delivery: not locked.

- Timeout:

If during parameter setting no pushbutton is pressed for 15 s, the unit exits the parameter setting mode.

9.2 Set output signals

9.2.1 Set the unit of measurement for system pressure

▶ Select [uni] and set the unit of measurement: [bAr], [kPa], [PSi], [inHg].	

9.2.2 Set the output function

▶ Select [ou1] and set the function: - [Hno] = hysteresis function/normally open, - [Hnc] = hysteresis function/normally closed, - [Fno] = window function/normally open, - [Fnc] = window function/normally closed.	

9.2.3 Set the switching limits (hysteresis function)

▶ Make sure that for [ou1] the function [Hno] or [Hnc] is set. ▶ Select [SP1] and set the value at which the output switches.	
▶ Select [rP1] and set the value at which the output switches off. rP1 is always smaller than SP1. The unit only accepts values which are lower than SP1.	

9.2.4 Set the switching limits (window function)

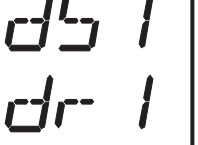
▶ Make sure that for [ou1] the function [Fno] or [Fnc] is set. ▶ Select [FH1] and set the upper limit of the acceptable range.	
▶ Select [FL1] and set the lower limit of the acceptable range. FL1 is always lower than FH1. The unit only accepts values which are lower than the value for FH1.	

9.3 User settings (optional)

9.3.1 Set delay for the switching outputs

- [dS1] = time delay for SP1 / FH1. If the system pressure exceeds SP1 or if the system pressure enters the acceptable range (window), the output changes the switching status when the time dS1 has elapsed.
- [dr1] = time delay for rP1 / FL1. If the system pressure falls below rP1 or if the system pressure leaves the acceptable range (window), the output changes the switching status when the time dr1 has elapsed.

▶ Select [dS1] or [dr1] and set the value between 0 and 5000 ms in steps of 2 ms (at 0 the time delay is not active).



9.3.2 Set damping for the switching outputs

▶ Select [dAP] and set the value.

dAP value = response time between pressure change and change of the switching status in milliseconds.

The following fixed values can be set; they define the switching frequency (f in Hz) of the output:

dAP	6	10	30	60	100	250	500	1000	2000
f	80	50	16	8	5	2	1	0.5	0.25

9.3.3 Configuration of the display

▶ Select [diS] and set the update rate and orientation of the display:
- [d1]: update of the measured values every 50 ms.
- [d2]: update of the measured values every 200 ms.
- [d3]: update of the measured values every 600 ms.
- [Ph]: display of the pressure peaks remains for a short time (peak hold).
- [rd1], [rd2], [rd3], [rPh]: display as for d1, d2, d3; rotated by 180°.
- [OFF]: the display is switched off in the operating mode.

▶ Select [cLor] and define the colour of the digital display:
- [r-on]: display = red if output 1 is switched; display = green if output 1 is not switched.
- [G-on]: display = green if output 1 is switched; display = red if output 1 is not switched.
- [red]: the colour of the display is red / does not change.
- [Gren]: the colour of the display is green / does not change.

9.3.4 Zero-point calibration

▶ Select [coF] and set a value between -2 % and 2 % of the measuring span. The internal measured value "0" is shifted by this value.	
As an alternative: Automatic adjustment of the offset in the range 0 bar ± 2 % of the measuring span. ▶ Make sure that there is no system pressure or that there is a differential pressure of 0 bar or that it is as close as possible to the 0 bar mark. ▶ Press [Mode/Enter] until [tcoF] appears. ▶ Press [Set] and keep it pressed. > The current offset value (in %) flashes briefly. ▶ Release [Set]. ▶ Briefly press [Mode/Enter] (= to confirm the new offset value). Reset of the taught value: ▶ Select [coF] and set the value [0].	

9.3.5 Differential pressure measurement: optimisation of the sensor accuracy

During differential pressure measurement the sensor accuracy can be optimised: An average system pressure value is entered that is close to the operating pressure on the main connection (G1/8): ▶ Select [SySP] and then briefly press [Set]. > The currently set value is displayed. ▶ Press [Set] and keep it pressed. > After 5 s: The average system pressure value can be set in the range of 0...+10 bar and in steps of 0.2 bar (unit depending on the setting of [uni]). ▶ Briefly press [Mode/Enter]. > The new set value is confirmed.	

9.4 Service functions

9.4.1 Read min/max values for the system pressure

▶ Select [Hi] or [Lo], briefly press [Set]. [Hi] = maximum value, [Lo] = minimum value. Delete memory: ▶ Select [Hi] or [Lo]. ▶ Press [Set] and keep it pressed until [----] is displayed. ▶ Briefly press [Mode/Enter].	

9.4.2 Reset all parameters to factory setting

▶ Select [rES]. ▶ Press [Set] and keep it pressed until [----] is displayed. ▶ Briefly press [Mode/Enter]. We recommend noting down your own settings before carrying out a reset (→ 12 Factory setting).	

10 Operation

After power on, the unit is in the Run mode (= normal operating mode). It carries out its measurement and evaluation functions and provides output signals according to the set parameters.

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Operation indication → chapter 7 Operating and display elements.

10.1 Read set parameters

▶ Press [Mode/Enter] until the requested parameter is displayed.
▶ Briefly press [Set].
> The unit displays the corresponding parameter value for approx. 15 s. After another 15 s it returns to the Run mode.

10.2 Error indications

[OL]	Overload pressure (measuring range exceeded)
[UL]	Underload pressure (below measuring range)
[SC1]	Short circuit in OUT1*
[C.Loc]	Active IO-Link communication, setting buttons locked, parameter change is rejected.
[S.Loc]	Setting buttons locked, parameter change is rejected, unlocking only possible via IO-Link interface.
[Err]	Flashing: internal fault

*The output concerned is switched off as long as the short circuit exists.
The messages SC1 and Err are shown even if the display is switched off.

11 Technical data and scale drawing

Technical data and scale drawing at www.ifm.com → Data sheet search → Enter the article number.

12 Factory setting

	Factory setting	User setting
SP1 / FH1	**25% VMR ***	
rP1 / FL1	**23% VMR ***	
ou1	**Hno**	
coF	**0.0**	
SySP	**0.0**	
dS1	**0**	
dr1	**0**	
dAP	**6**	
diS	**d2**	
uni	**bAr**	
cLor	**r-on**	

* = the indicated percentage of the final value of the measuring range (VMR) of the corresponding sensor is set in bar

More information at www.ifm.com